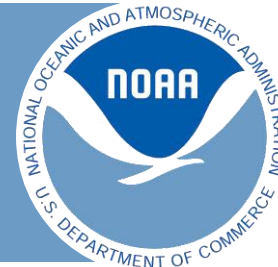




UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

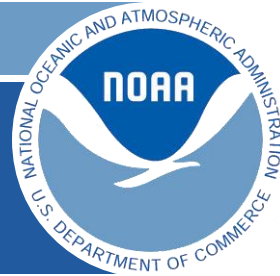


CPC Operational Outlooks: Launch Schedule, Forecast Process and Recent Verification

Jon Gottschalck

Operational Prediction Branch
NWS / NCEP / Climate Prediction Center

Climate Diagnostics and Prediction Workshop
College Park, MD
October 21-24, 2013

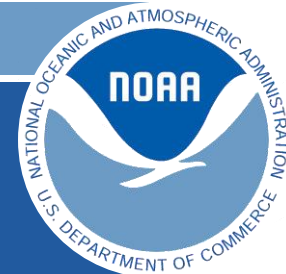


Outline

- (1) Review CPC Operational Outlooks: Launch schedule, forecast process and select tools
- (2) Recent verification over the 1-1.5 years

Forecasts Reviewed:

- ➔ **Extended Range Outlooks (Days 6-10 and Days 8-14)**
- ➔ **Monthly and Seasonal Outlooks**
- ➔ Drought Outlooks
- ➔ Hazards Outlooks (U.S., Global Tropics, Africa, Central America, etc.)

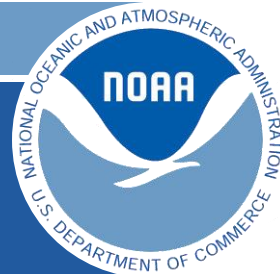


CPC Intraseasonal-to-Interannual Outlooks

Outlook	Variables	Type	Frequency	Release Date	Release Time
Days 8-14	Temp/Precip	Probabilistic	Daily	Daily	3 PM
Monthly	Temp/Precip	Probabilistic	2x per month	3 rd Thurs of month / Last day of month	8:30 AM, 3 PM
Seasonal	Temp/Precip	Probabilistic	1x per month	3 rd Thursday of month	8:30 AM
Monthly drought	Drought tendency	Categorical	1x per month	Last day of month	3 PM
Seasonal drought	Drought tendency	Categorical	1x per month	3 rd Thursday of month	8:30 AM
U.S. Hazards	Temps, precip, winds, etc.	Categorical	Daily	Monday - Friday	3 PM
Global Tropics, Africa, etc.	Precip, TCs, etc.	Categorical	Weekly	Tuesday or Wednesday	12 PM

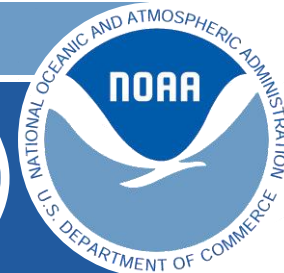


NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



CPC Operational Outlooks

- **Extended Range Outlooks**
- Monthly and Seasonal Outlooks



Extended Range Forecast (ERF)

INTERACTIVE DISPLAY - UPDATED: 16 OCT 2013

[1314-1362 East Hastings Lake Road,
Jonesville, MI 49250, USA](#)

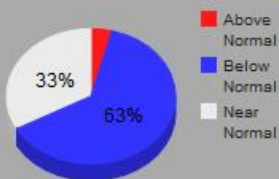
Enter Location

Enter

Three Category Temperature Outlook

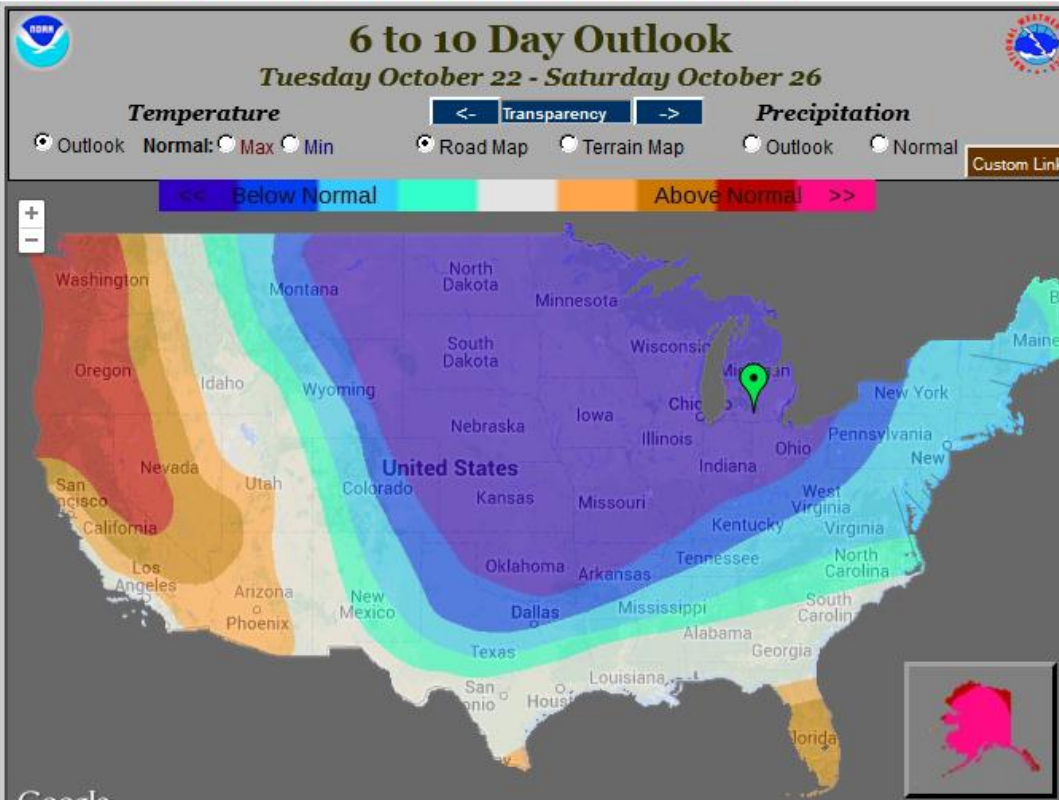
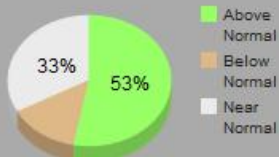
Normal Maximum Temperature: **57**

Normal Minimum Temperature: **37**



Three Category Precipitation Outlook

Normal Precipitation: **0.51**



Google

6-10 DAY OUTLOOK

TEMPERATURE PRO

MADE 16 OCT 2013

VALID OCT 22 - 26, 2013

(DEG F) SHADED AREAS ARE FCST
VALUES ABOVE (A) OR BELOW (B) NORMAL
UNSHADED AREAS ARE NEAR-NORMAL

MADE 16 OCT 2013

VALID OCT 22 - 26, 2013

(TENTH OF INCHES) SHADED AREAS ARE FCST
VALUES ABOVE (A) OR BELOW (B) MEDIAN
UNSHADED AREAS ARE NEAR-MEDIAN

90% 80% 70% 60% 50% 40% 33% 33% 40% 50% 60% 70% 80% 90%

Probability of Below

Normal

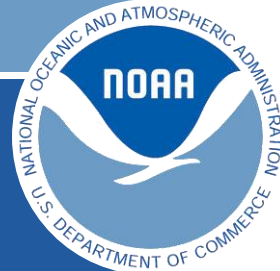
Probability of Above

90% 80% 70% 60% 50% 40% 33% 33% 40% 50% 60% 70% 80% 90%

Probability of Below

Normal

Probability of Above



Assessment of Models

Forecaster considerations:

- Overall model system agreement
- Ensemble spread
- Run-to-run continuity, outliers
- Consistency with tropical forcing?

Select a Forecast Date: 11/03/2012

Operational GFS Maps

GFS Ensemble Maps

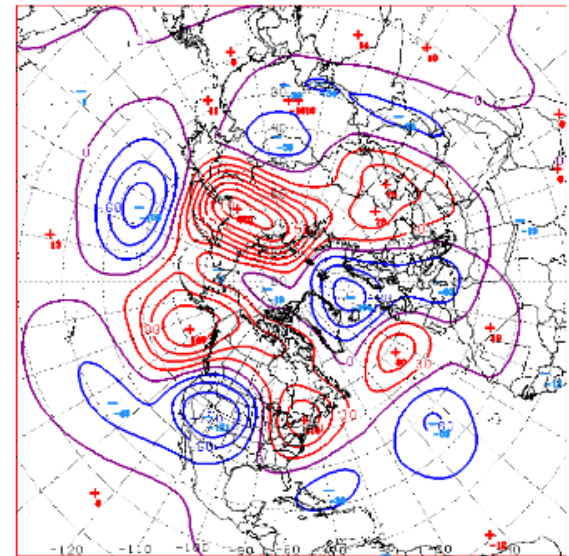
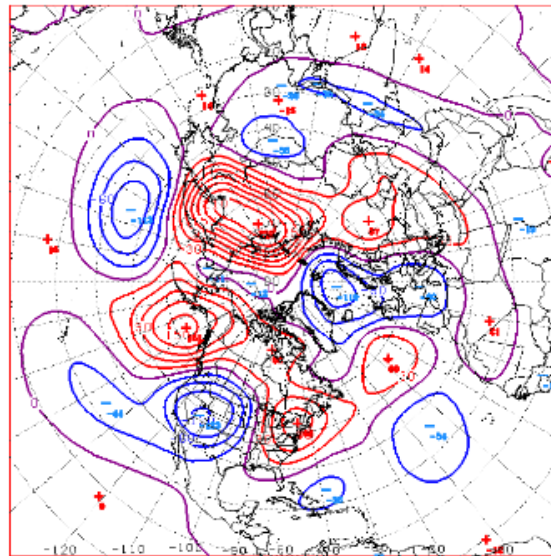
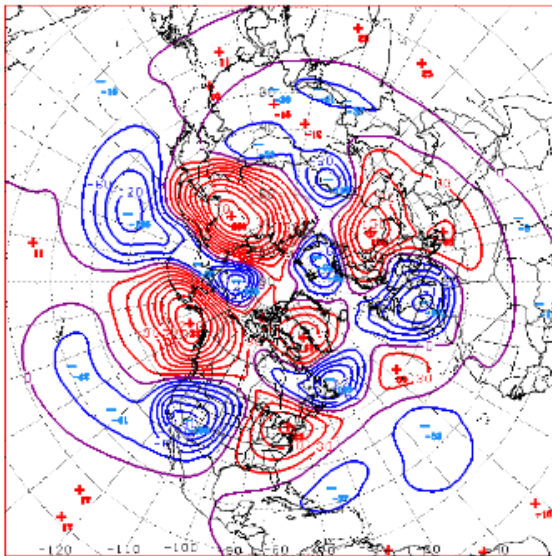
GFS SuperEnsemble

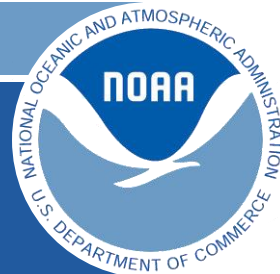
Select a Forecast Date: 11/03/2012

Operational GFS Maps

GFS Ensemble Maps

GFS SuperEnsemble





ERF Process

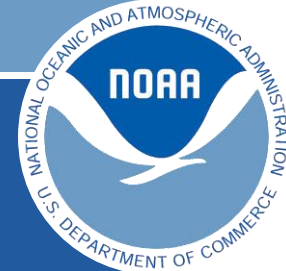
Dynamical model
forecasts

Historical
observations

Downscaling methodologies, (regression,
analog, teleconnections, etc.)

- (1) Subjectively weighted average official 500-hPa height and anomaly outlook
- (2) Downscale to create a set of surface temp and precipitation tools
- (3) Direct Model Post Processed Output
- (4) Assess other factors (MJO, AO, snow cover, SST, soil moisture, etc.)
- (5) Probabilistic temp/precip maps created subjectively based on objective tools
- (6) Write prognostic forecast discussion outlining rationale, challenges and uncertainty of the forecast

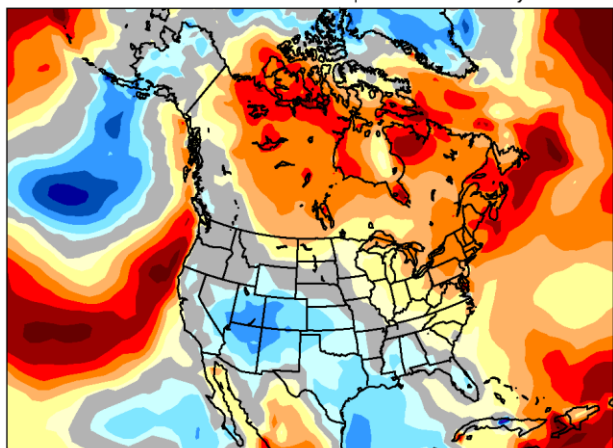
Dissemination to public



Direct Model Post Processed Output

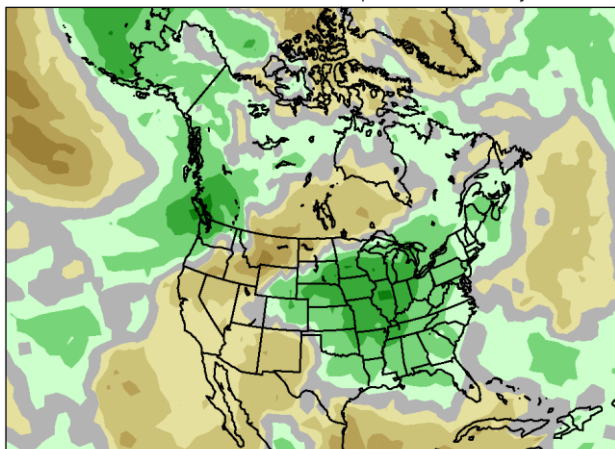
ESRL Reforecast – Hindcast Calibration

2013-09-28 GEFS Reforecast-Calibrated Temperature Forecast for Days 6-10



Probability of Below Normal Normal Probability of Above Normal
90% 80% 70% 60% 50% 40% 33% 33% 40% 50% 60% 70% 80% 90%

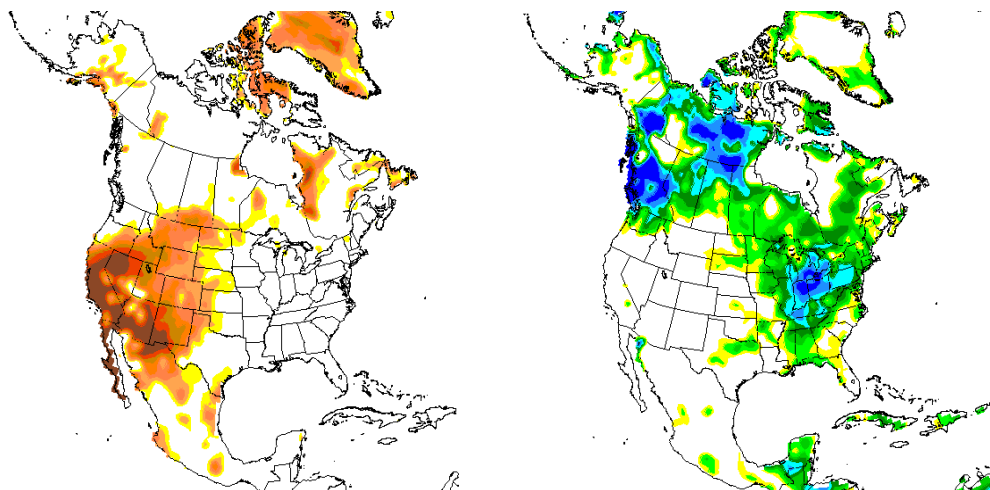
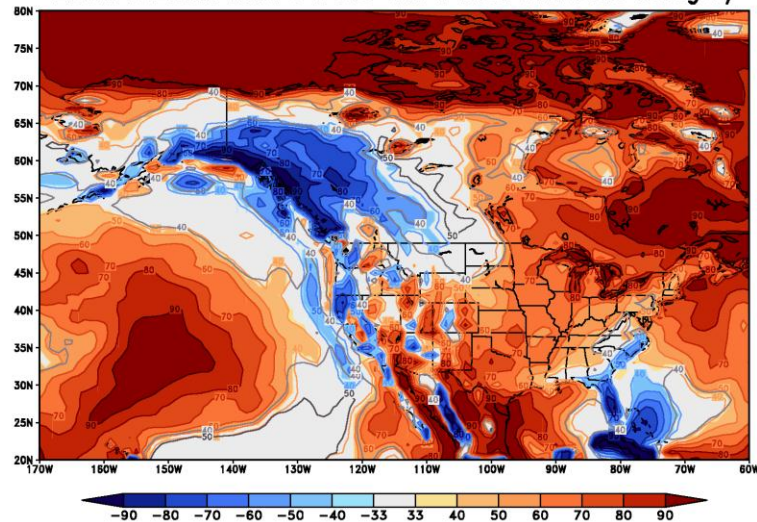
2013-09-28 GEFS Reforecast-Calibrated Precipitation Forecast for Days 6-10

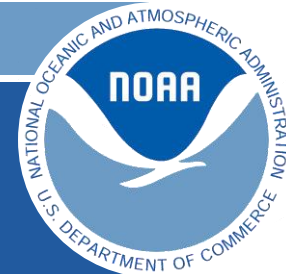


Probability of Below Median Median Probability of Above Median
90% 80% 70% 60% 50% 40% 33% 33% 40% 50% 60% 70% 80% 90%

NAEFS –Recent Conditions Calibration

20121102.06Z NAEFS D+08 2m T Most Probable Category

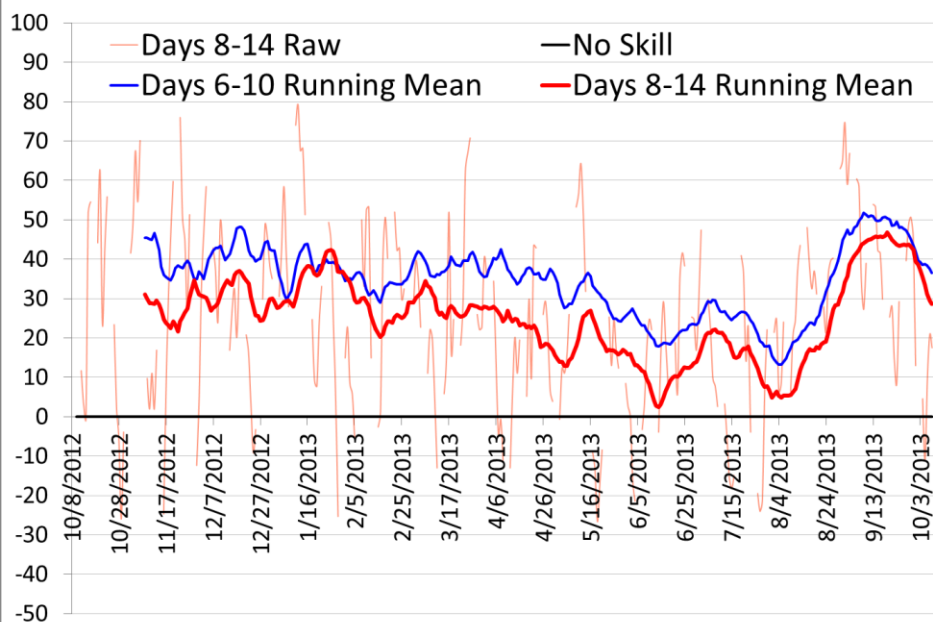




ERF Verification – Time Series

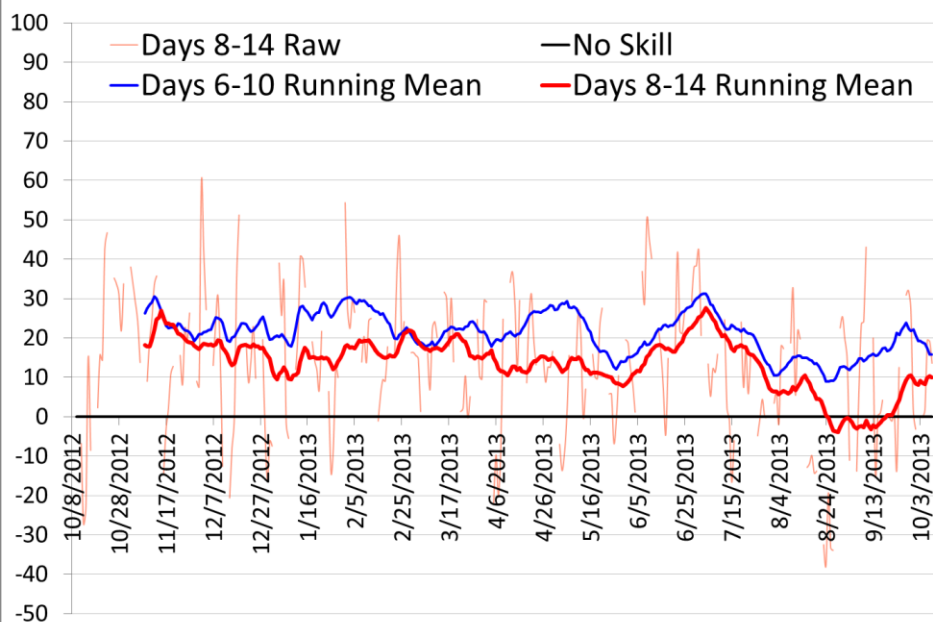
Days 8-14 Temperature

Heidke Skill Score -- Oct 2012-Sep 2013



Days 8-14 Precipitation

Heidke Skill Score -- Oct 2012-Sep 2013

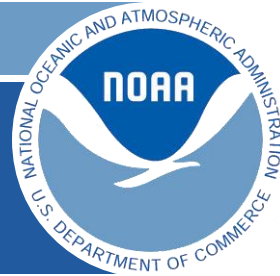


Outlook Type	Averaging Period	HSS
Days 8-14	Past year	25.2
Days 6-10	Past year	34.7
Days 8-14	2008-2013	23.4

Outlook Type	Averaging Period	HSS
Days 8-14	Past year	13.4
Days 6-10	Past year	21.2
Days 8-14	2008-2013	10.2

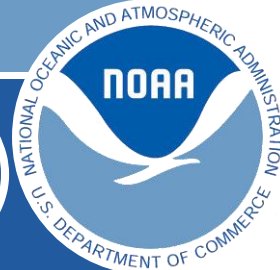


NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

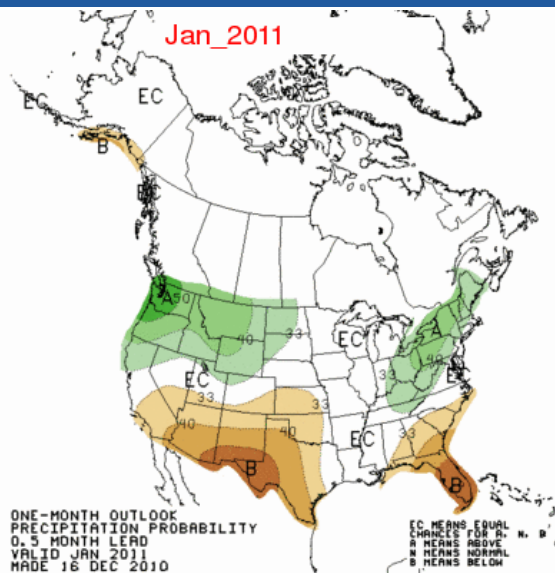
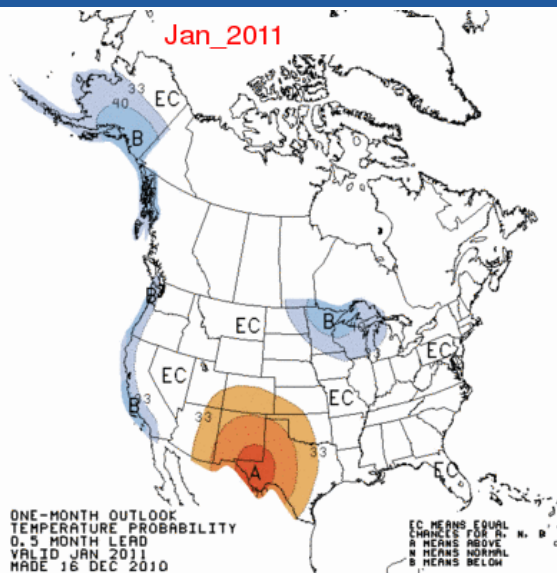


CPC Operational Outlooks

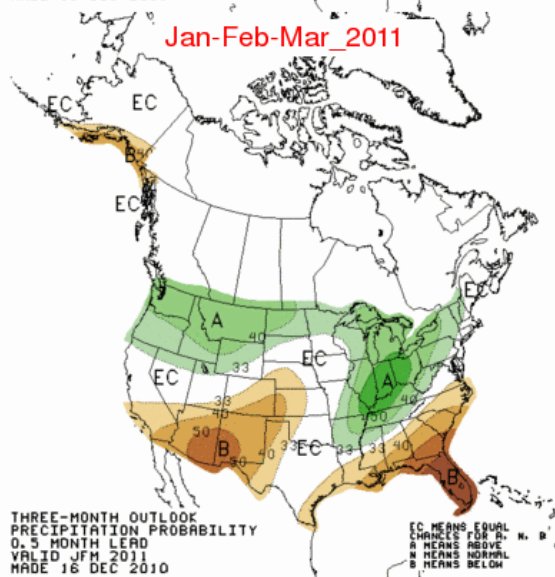
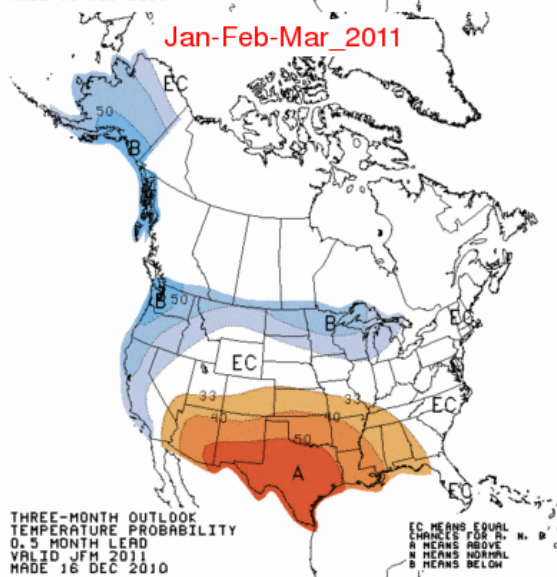
- Extended Range Outlooks
- **Monthly and Seasonal Outlooks**



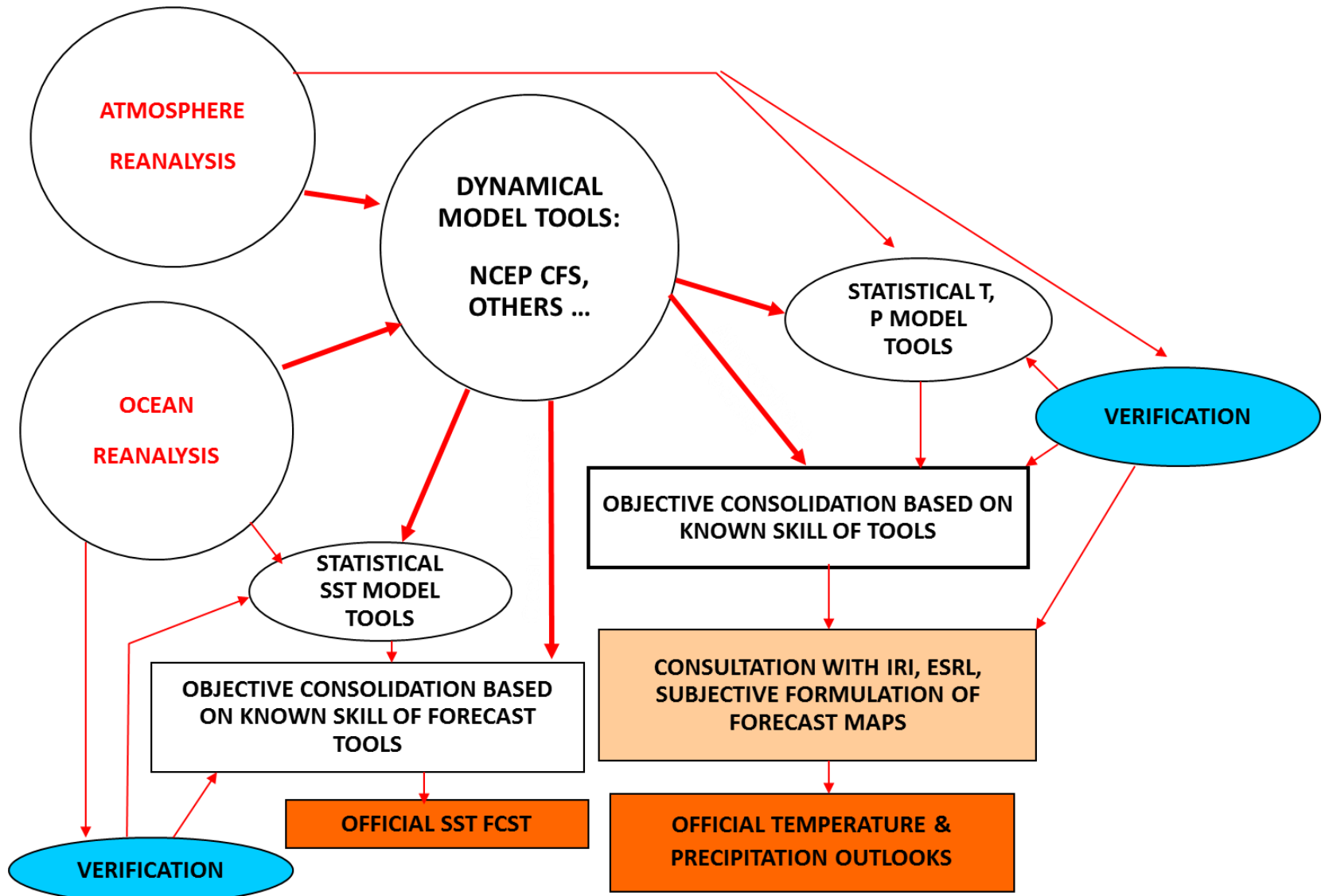
Monthly / Seasonal Outlooks (LRF)

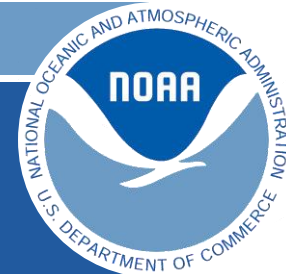


Monthly



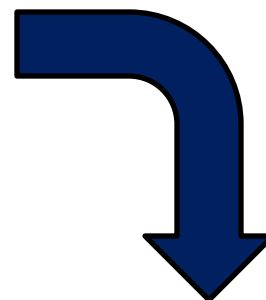
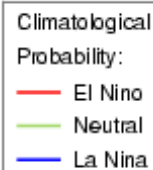
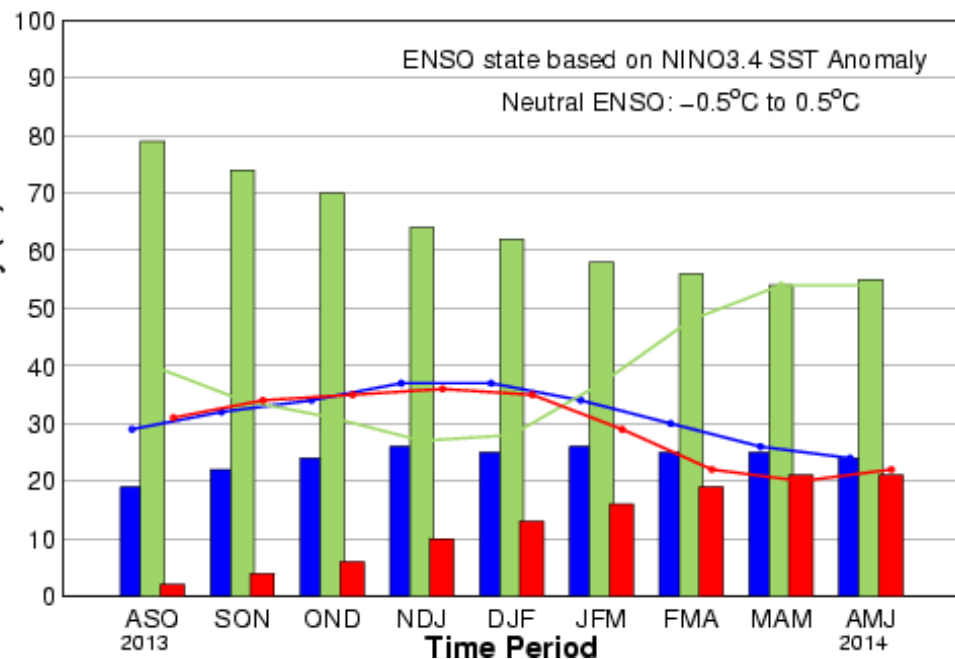
Seasonal





ENSO Outlook

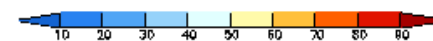
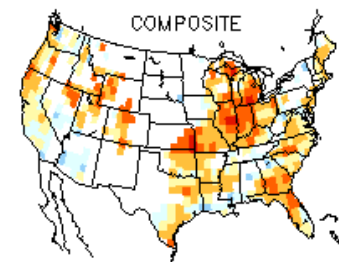
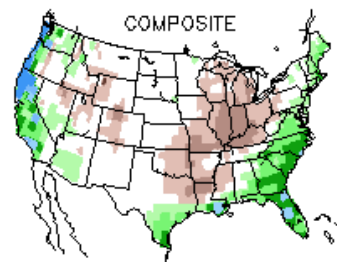
Early-Sep CPC/IRI Consensus Probabilistic ENSO Forecast

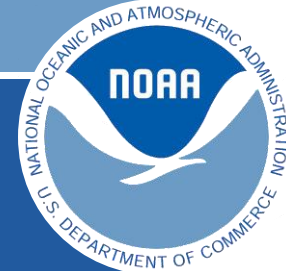


JFM EL NINO PRECIPITATION ANOMALIES (MM)
AND FREQUENCY OF OCCURRENCE (%)

ANOMALIES

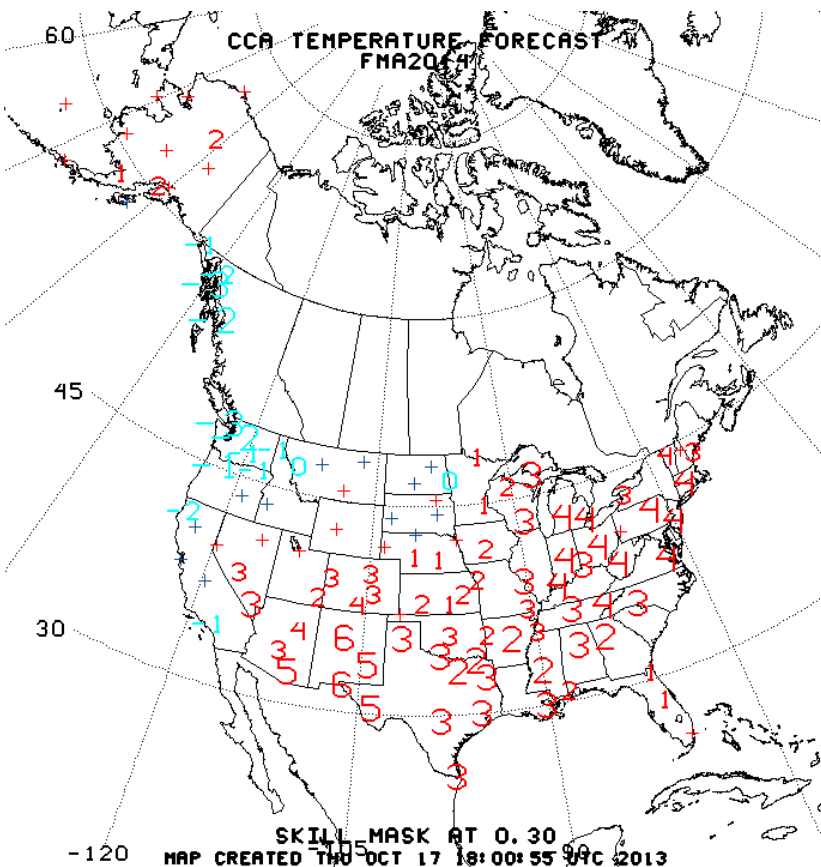
FREQUENCY





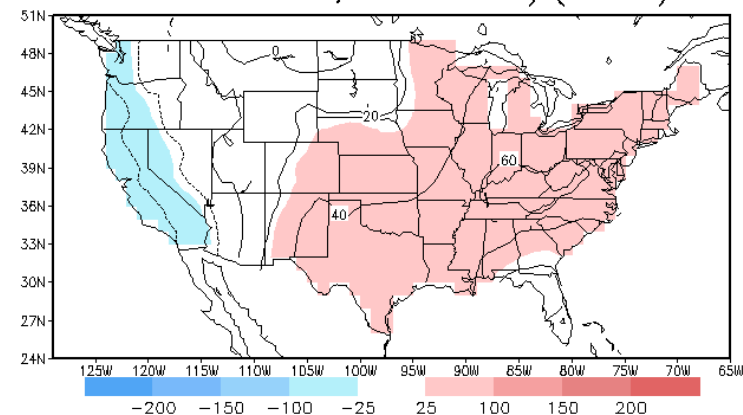
Forecast Guidance

Canonical Correlation Analysis

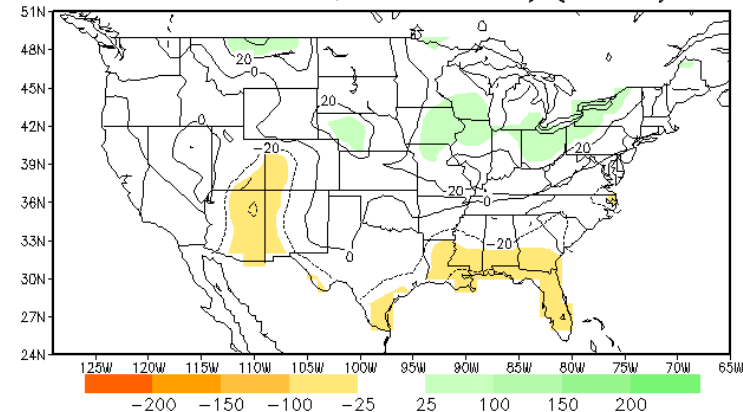


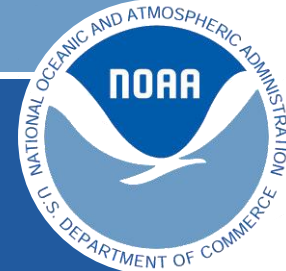
Long term trends

hmgz temperature OCN (15 (15!) year) forecast for FMA
base 1981–2010; units: anomaly (sdX100)



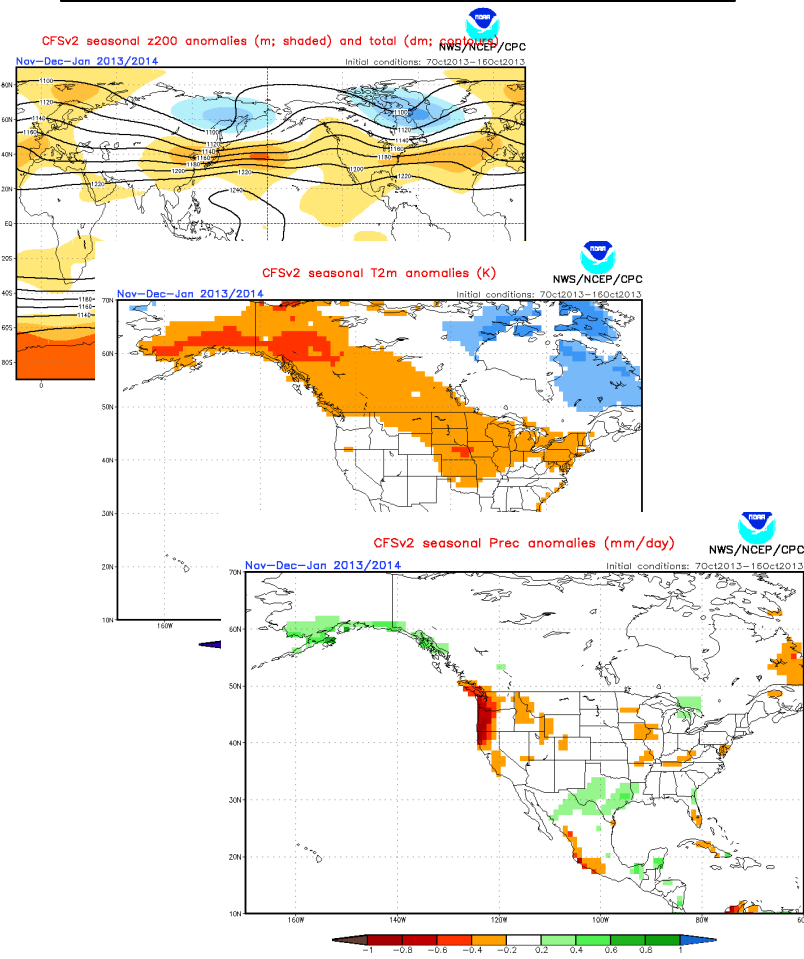
hmgz precipitation OCN (15 year) forecast for FMA
base 1981–2010; units: anomaly (sdX100)



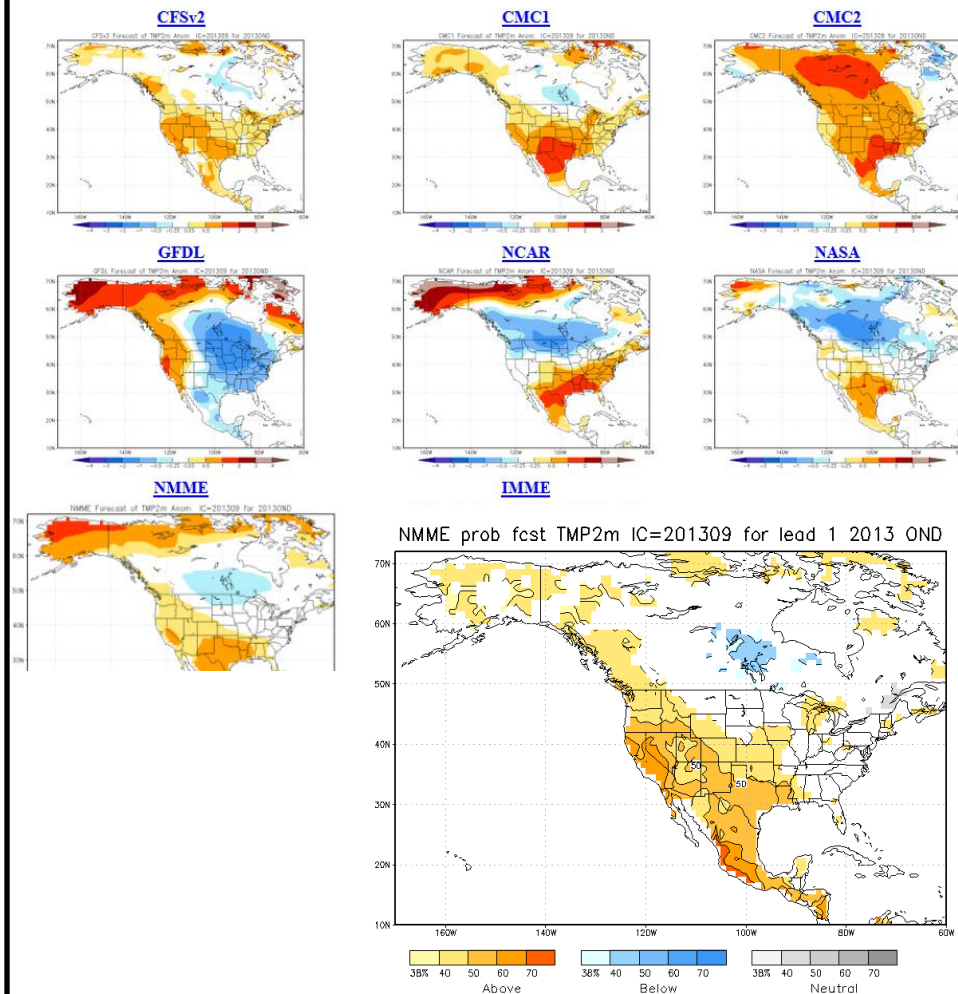


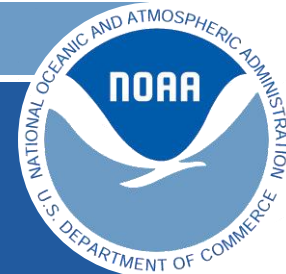
Forecast Guidance

Climate Forecast System



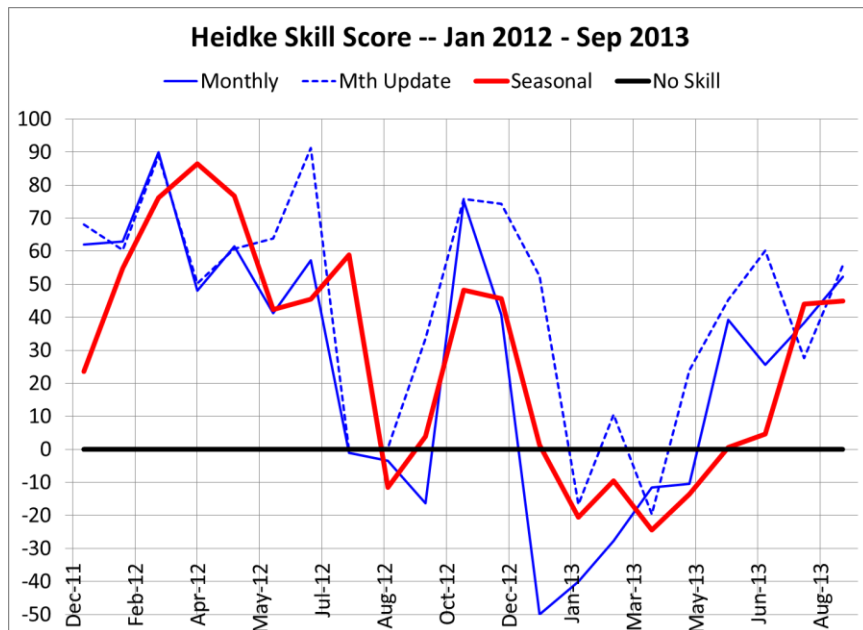
National Multi Model Ensemble



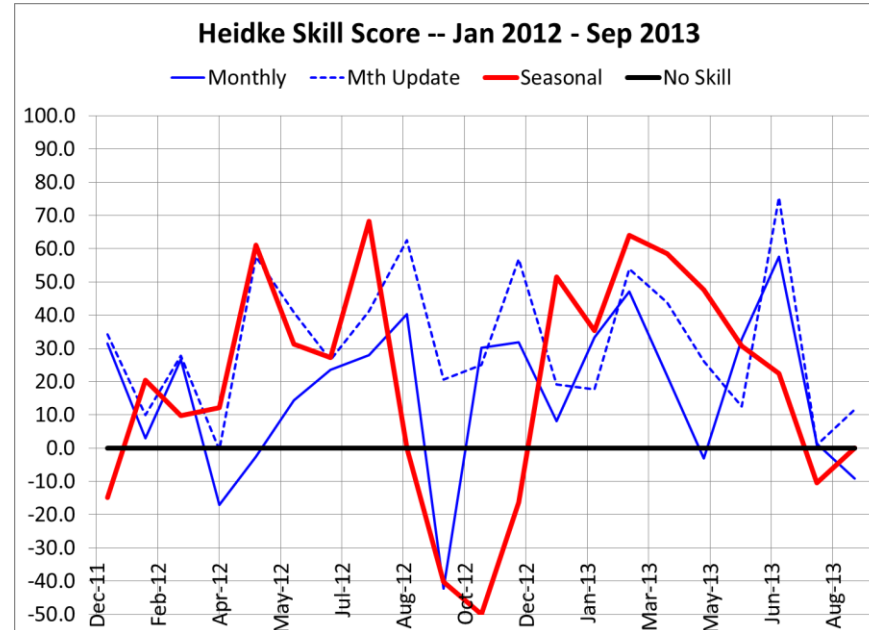


LRF Verification – Time Series

Temperature

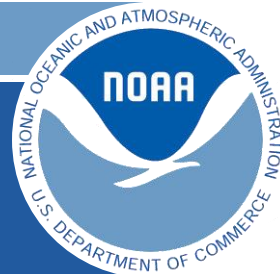


Precipitation



Outlook Type	Averaging Period	HSS
Seasonal	Past year	27.5
Monthly	Past year	25.4
Revised Monthly	Past year	43.2
Seasonal	1995-2013	23.6

Outlook Type	Averaging Period	HSS
Seasonal	Past year	19.5
Monthly	Past year	17.0
Revised Monthly	Past year	31.6
Seasonal	1995-2013	13.3

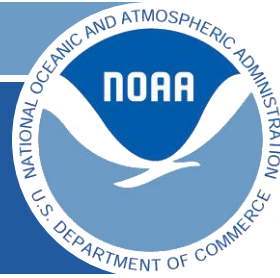


FY14 Ongoing Work

- CPC is developing an objective, skill weighted consolidation for the ERF using ensemble regression similar to what has been done with the LRF
- Emphasis on transition of CPC Hazards Outlooks to probabilistic formats targeting Week-2
- Inclusion of NMME forecast into current LRF consolidation process
- Revisit trends and how best to use in CPC seasonal outlooks



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

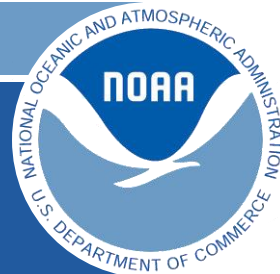


Questions and Comments

Thank you for your attention

Feel free to contact me anytime via e-mail if you have comments or questions.

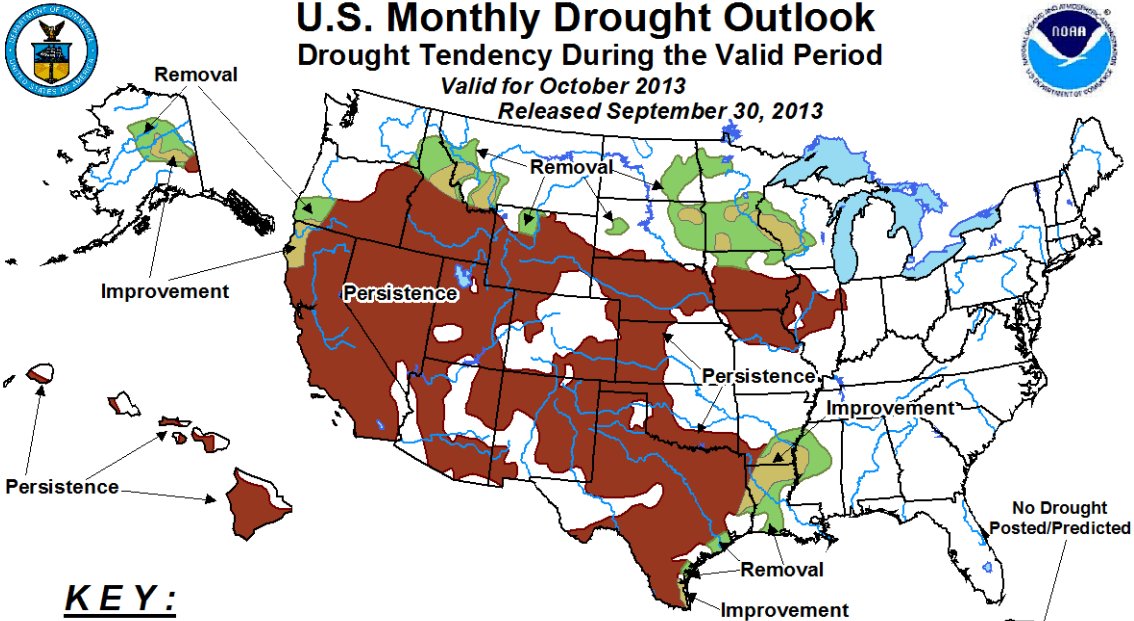
Jon.Gottschalck@noaa.gov



Drought Outlooks

U.S. Monthly Drought Outlook Drought Tendency During the Valid Period

Valid for October 2013
Released September 30, 2013



KEY:

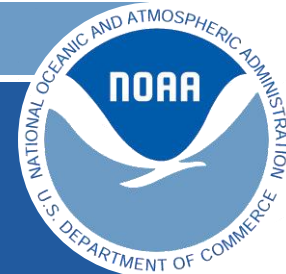
- Drought persists or intensifies
- Drought remains but improves
- Drought removal likely
- Drought development likely

Author: Brad Pugh/Anthony Artusa, Climate Prediction Center, NOAA
http://www.cpc.ncep.noaa.gov/products/expert_assessment/mdo_summary.html

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor.

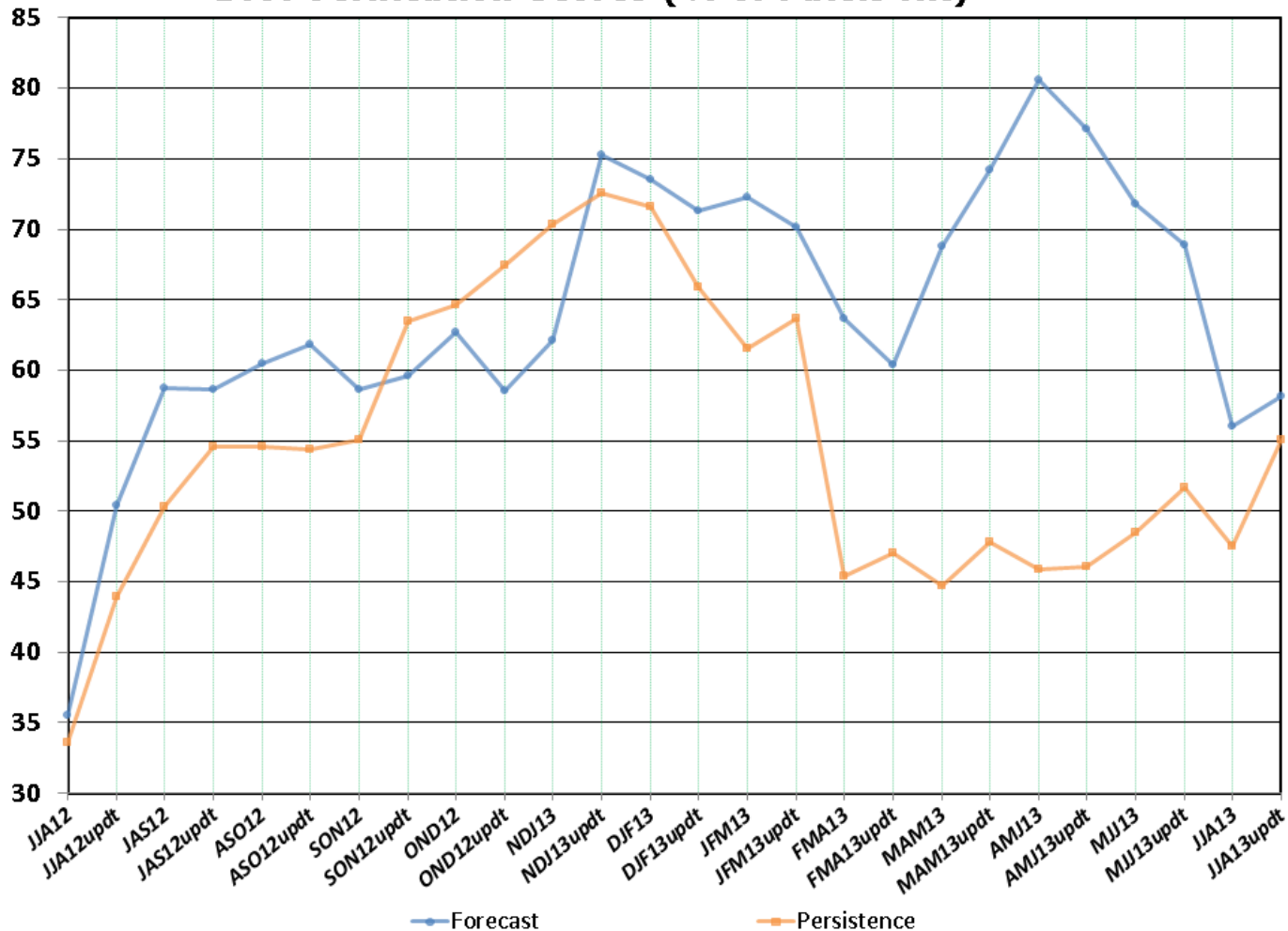
NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period although drought will remain. The green areas imply drought removal by the end of the period (D0 or none)

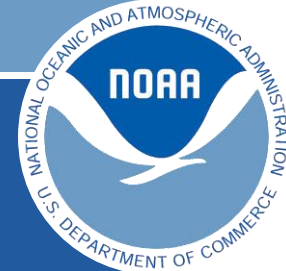
- Introduced monthly drought outlook in June 2013
- Changes in drought tendency categories this past year
- Range of timescales used:
 - Short-, medium-, and extended-range model guidance and forecast tools
 - CPC extended range, monthly and seasonal outlooks
- Impact of climatological wet and dry seasons also play a role



Drought Outlook Verification

D.O. Verification Scores (% of Pixels Hit)

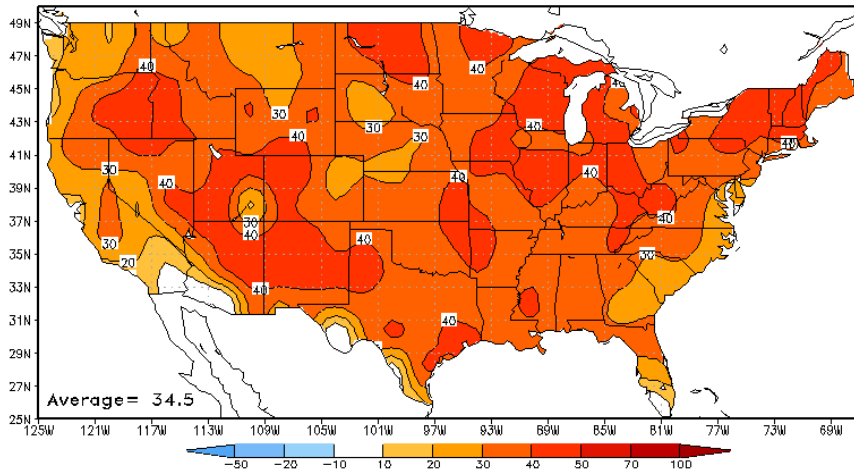




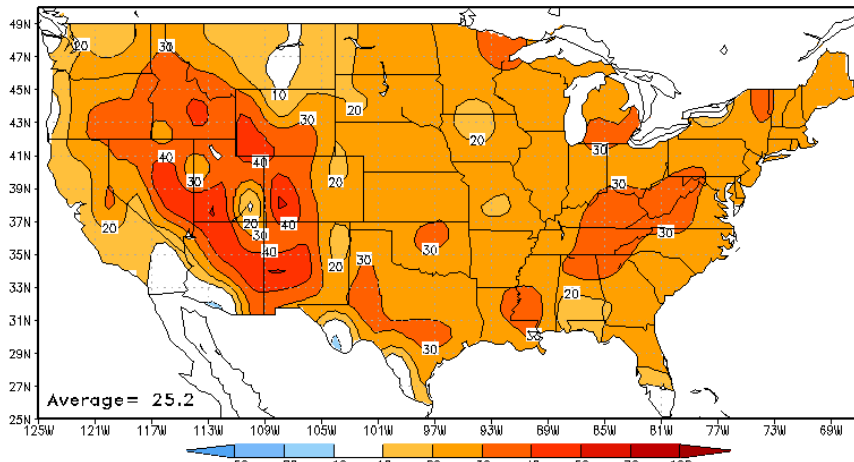
ERF Verification – Spatially

Temperature

6 to 10 Day Temperature Heidke Skill Score
365 Days of Manual Forecasts From 20121010 to 20131009

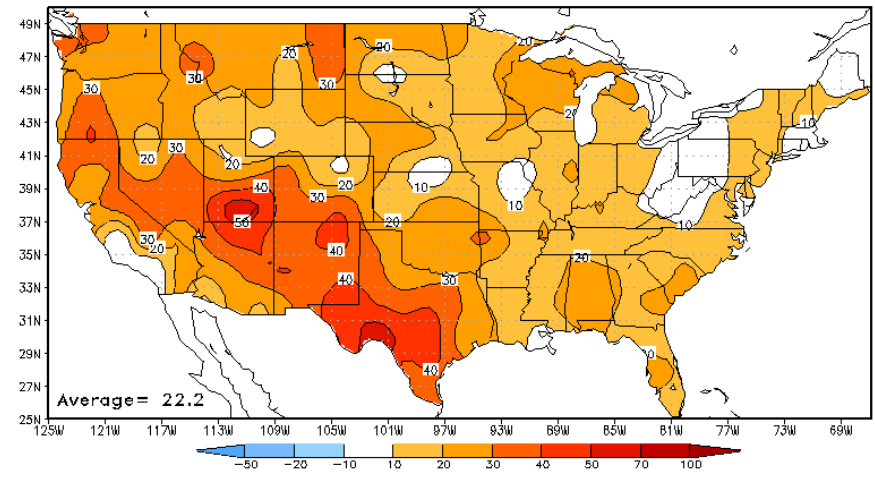


8 to 14 Day Temperature Heidke Skill Score
365 Days of Manual Forecasts From 20121009 to 20131008

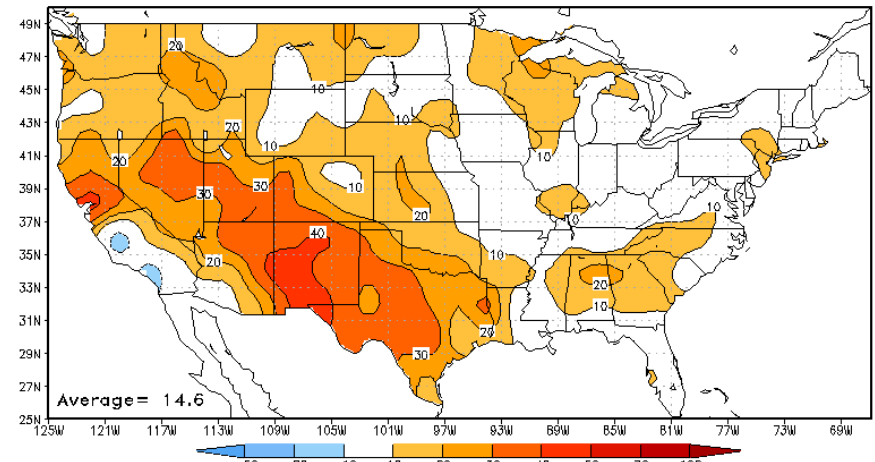


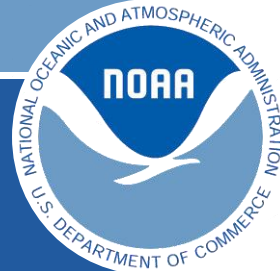
Precipitation

6 to 10 Day Precipitation Heidke Skill Score
365 Days of Manual Forecasts From 20121010 to 20131009



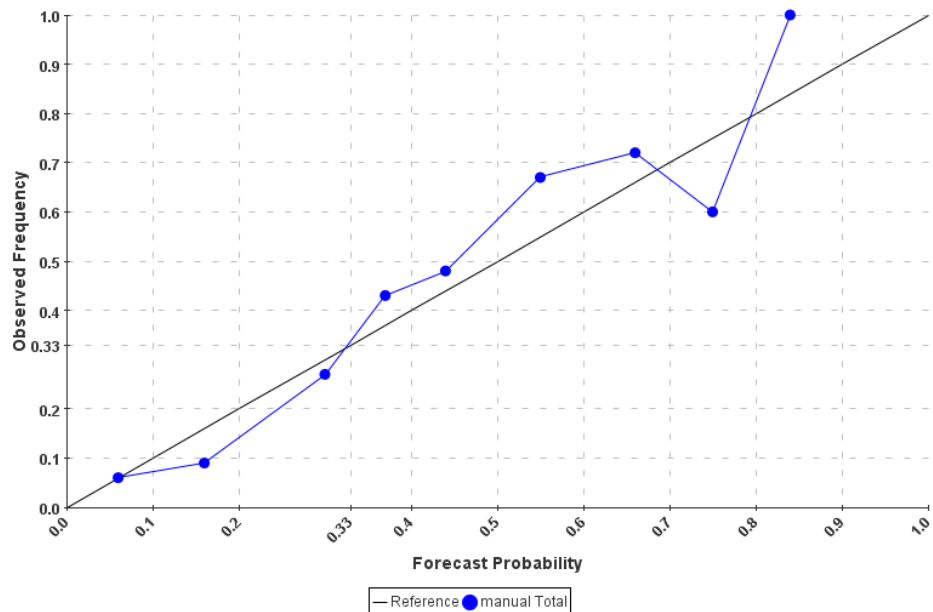
8 to 14 Day Precipitation Heidke Skill Score
365 Days of Manual Forecasts From 20121009 to 20131008



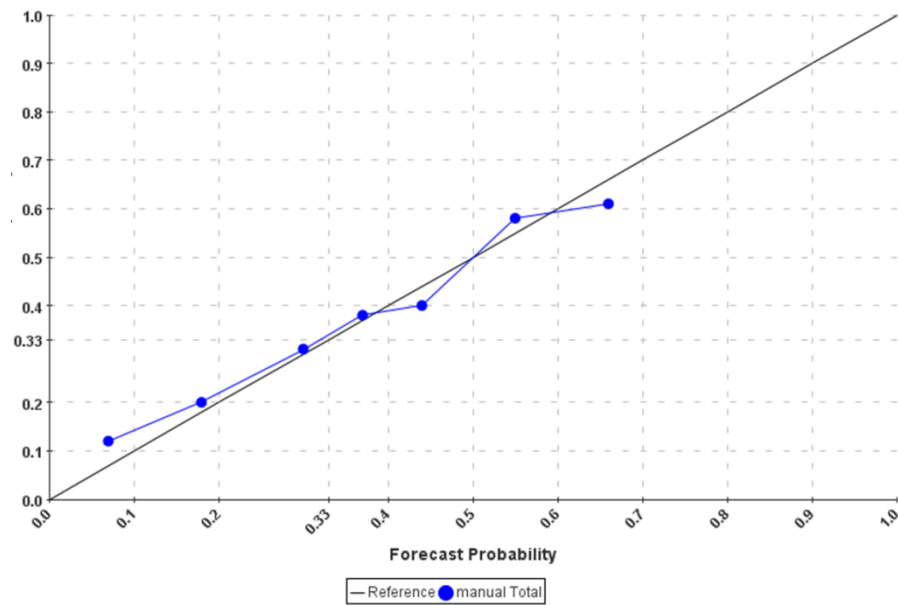


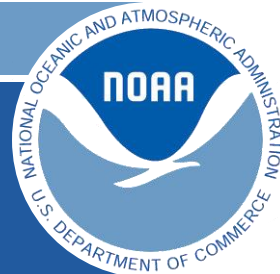
ERF Reliability

8-14 Day Temperature Reliability Scores for all categories



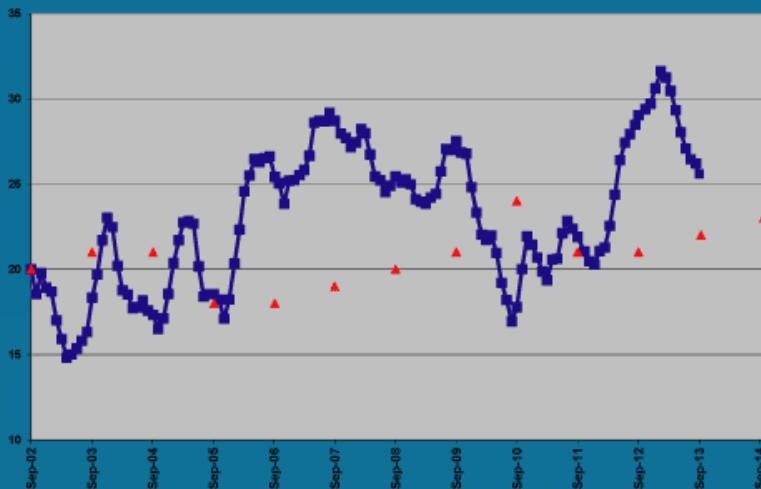
8-14 Day Precipitation Reliability Scores for all categories





NWS HQ Metrics

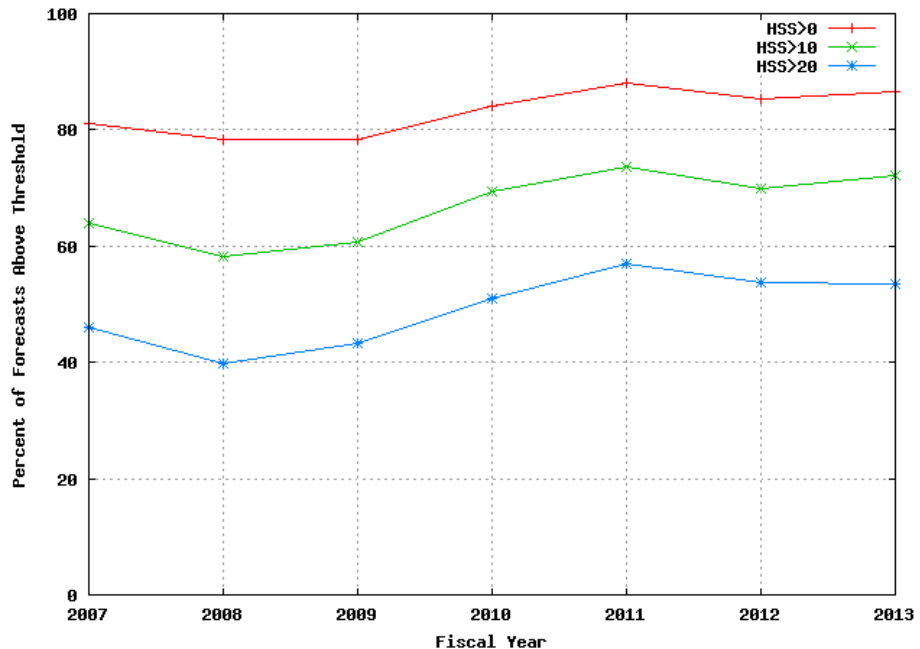
U.S. Seasonal Temperature - Skill



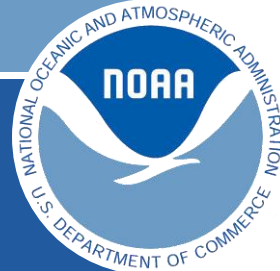
"America's Weather Enterprise: Protecting Lives, Livelihoods, and Your Way of Life"

48 month running mean of
non-EC seasonal temperature HSS

Climate Prediction Center New GPRA Metrics

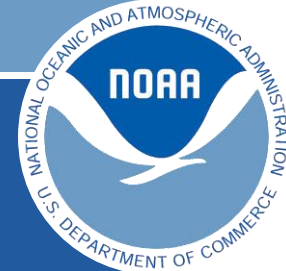


Percent of "useful" forecasts
(above a given HSS threshold) from
ERF and LRF temperature and
precipitation outlooks

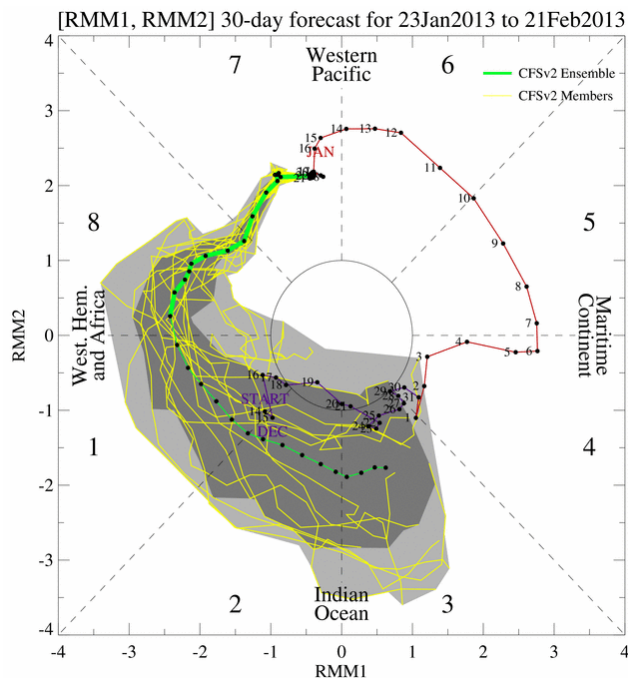
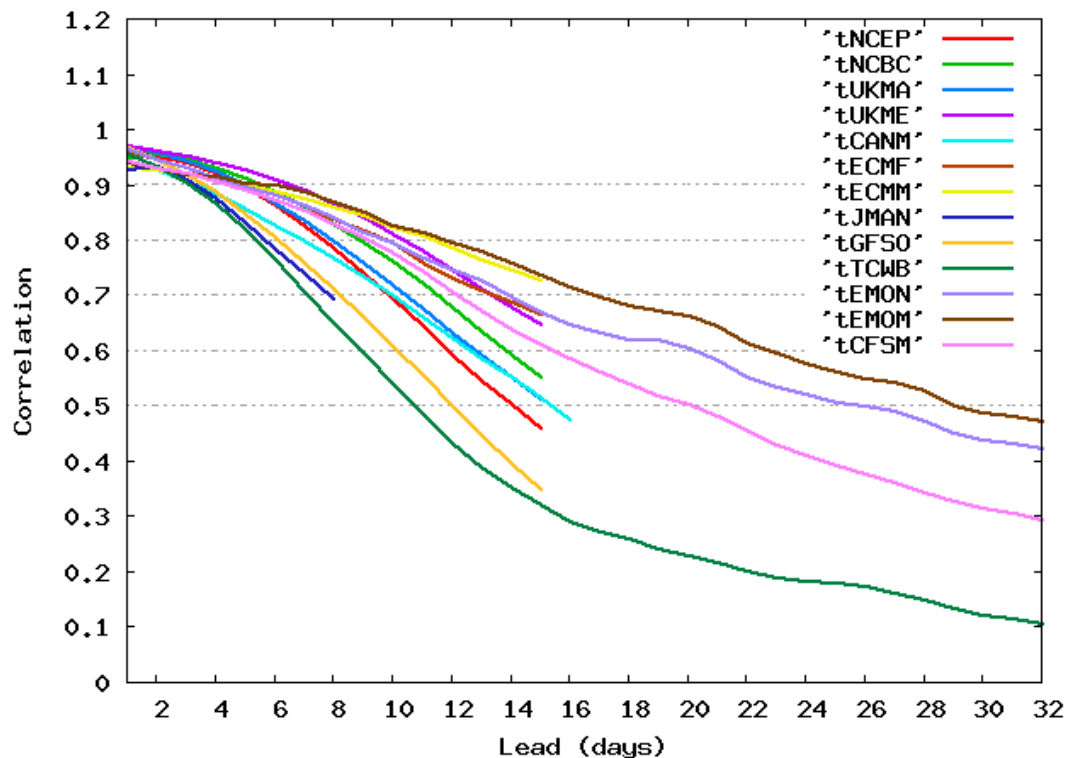
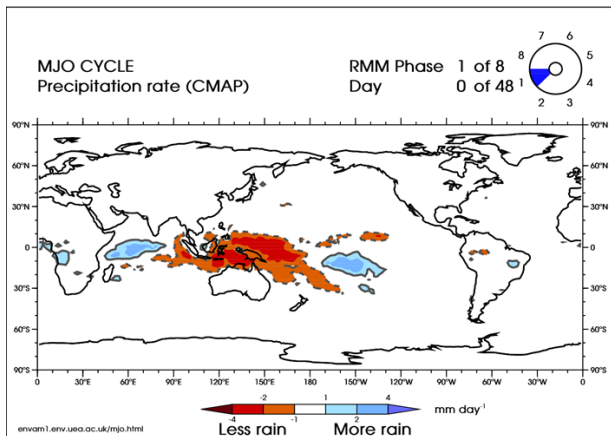


Summary

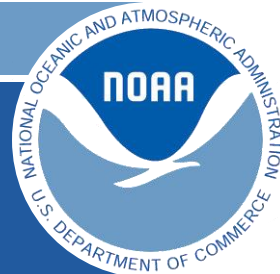
- CPC operational outlooks are wide ranging and span multiple time scales. Have varying launch schedules, forecast process and objectives.
- CONUS ERF temperature scores were highest during Sep 2013 and lowest between Jun-Aug 2013. Precipitation forecasts were poor during Sep 2013. Skill was highest for the Southwest and Intermountain west.
- Seasonal temperature outlooks were good for much of 2012 but were poor during the late winter and spring 2013. Precipitation scores were positive throughout most of the period, but poor during winter 2012-13.
- The greatest improvement over persistence in the seasonal drought outlooks occurred during the spring and summer months 2013.



MJO Index Verification



- Yellow Lines: 20 Individual Members, Green Line: Ensemble Mean
- RMM1 and RMM2 values for the most recent 40 days and forecasts for the next 30 days
- Light gray shading: 90% of forecasts, dark gray shading: 50% of forecasts



Global Tropics Hazards Outlook



Global Tropics Hazards and Benefits Outlook - Climate Prediction Center

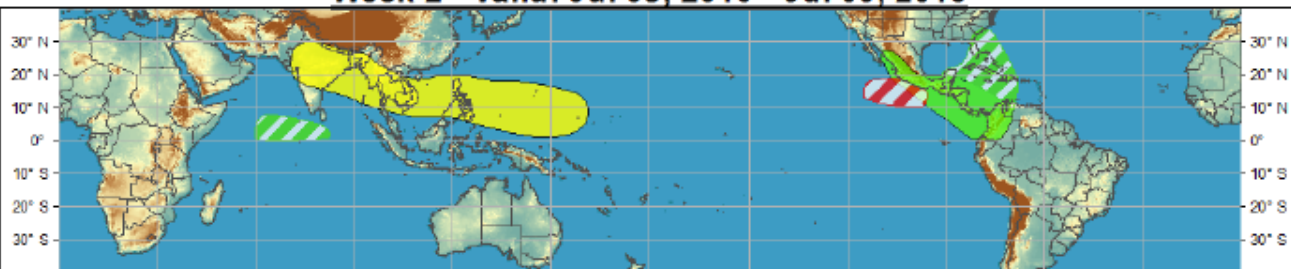
Week 1 - Valid: Jun 26, 2013 - Jul 02, 2013



Factors include ENSO, MJO, ER and Kelvin waves, statistical forecast tools (C-LIM, etc.), dynamical model output

Week 2 - Valid: Jul 03, 2013 - Jul 09, 2013

Weekly coordination with SUNY, CICS, JTWC, NHC, NPS and NWS regions



Confidence
High Moderate

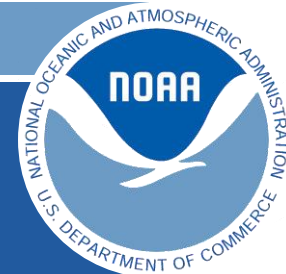
Produced: 06/25/2013

Forecaster: Rosencrans/Allgood

Tropical Cyclone Formation		Development of a tropical cyclone that eventually reaches tropical storm/cyclone strength.
Above-average rainfall		Weekly total rainfall in the upper third of the historical range.
Below-average rainfall		Weekly total rainfall in the lower third of the historical range.
Above-normal temperatures		7-day mean temperatures in the upper third of the historical range.
Below-normal temperatures		7-day mean temperatures in the lower third of the historical range.

Product is updated once per week. The product targets broad scale conditions integrated over a 7-day period for US interests only. Consult your local responsible forecast agency.





GTH Outlook Verification

